Lubachevsky 10-2

IN THE CLAIMS:

1. (Currently Amended) A method executed in hardware for simulating events in a physical system comprising the steps of:

~~assigning events of said physical system that are to be simulated to each of N processing elements (PEs); and~~

a) employing hardware that comprises N processing elements (PEs) that can communicate with each other;

b) subdividing said physical system into N subsystems and assigning a different subsystem of said subsystems to each of said N PEs;

c) in a simulation step, each of said PEs concurrently simulating a respective block of events that occur in each respectively assigned subsystem, where said block includes ~~said N PEs simulating events in parallel, in a simulation step where each processing element (PE) simulates assigned events in blocks of that include~~ M edge events, where M is approximately e $\log_e$N, e is approximately 2.71828, and an edge event is an event whose simulation in a processing element is directly affected by information originating in another processing element;

repeating step c) a chosen number of times; and

outputting results of said simulations from each of said N PEs.

2. (Currently Amended) The method of claim 1 where ~~each of~~ said simulation step[[s]] comprises one or more iterations.

3. (Currently Amended) The method of claim 2 where each of said iterations comprises a simulation phase followed by a communication phase and an assessment phase.

4. (Original) The method of claim 3 where, in each communication phase, each of said PEs shares information with one or more other PEs from said N PEs, which information is needed by said other PEs to simulate edge events of said other PEs.

2

Lubachevsky 10-2

5. (Original) The method of claim **4** where said information shared by each PE in a communication phase of an iteration is related to events simulated by said each PE in said iteration.

6. (Original) The method of claim **4** where said assessment phase carried out by each of said PEs comprises the steps of

determining whether the existence of a simulation error can be excluded, and

directing that another simulation iteration is to take place when the existence of a simulation error cannot be excluded.

7. (Previously Presented) The method of claim **6** further comprising a floor advancement step that is carried out in each of said PEs when said step of determining in said assessment phase concludes that there are no simulation errors in a simulation iteration, where the advancement step advances a simulation floor time of a present simulation step to form a modified simulation time floor, for simulating another block of M events in a next simulation step.

8. (Original) The method of claim **6** further comprising a step of advancing a simulation floor time from a simulation floor time of a present simulation step, to form a modified simulation floor time, for starting from said modified simulation floor time the simulation of another block of M events in a next simulation step, when said step of determining in said assessment phase concludes that there are no simulation errors in said present simulation step.

9. (Original) The method of claim **8** where said modified simulation floor time corresponds to the earliest simulation time of the Mth edge event simulated by said N PEs in said present simulation step.

10. (Original) The method of claim **4** where events are simulated seriatim in each simulation phase.

3

Lubachevsky 10-2

11. (Original) The method of claim **10** where for simulating a second event following a simulation of a first event,

a time interval is identified between a simulation time of said first event and a simulation time of said second event, and

said second event is identified for simulation.

12. (Original) The method of claim **11** where said second event is identified for simulation following a step of accounting for simulation of said first event and simulation of events in said other PEs from said N PEs.

13. (Original) The method of claim **12** where said accounting is based on present knowledge of states of said other events.

14. (Currently Amended) The method of claim **12** where said ~~accounts~~ accounting for simulation of events in said other PEs from said N PEs accounts for events simulated during said time interval.

15. (Original) The method of claim **11** where said second event is identified by employing a first random number.

16. (Original) The method of claim **11** where said time interval is identified with a second random number.

17. (Original) The method of claim **16** where said second random number is set to said first random number.

18. (Original) The method of claim **15** where said first random number is derived from a random variable having a uniform distribution.

19. (Original) The method of claim **15** where the seriatim simulation of each event in said block of M events, in a first iteration starting from a given simulation floor

4

Lubachevsky 10-2

time, employs an independently derived random number from said random variable, forming thereby a sequence of random numbers, and simulation of said block of M events in all subsequent iterations starting from said given simulation floor time employs said sequence of random numbers.

20. (Original) The method of claim 18 where the sequence of random numbers employed in one simulation step is different from a sequence of random numbers employed in another simulation step.

21. (New) Apparatus that includes N interacting processing elements (PEs), the improvement characterized by:

each of said N PEs storing a specification of a subsystem of a system composed of interacting subsystems; and

said N PEs (a) executing a selected number of simulation steps, and in each simulation step each of said PE's simulates a block of operational events of its associated subsystem, where a block contains M edge events, where M is approximately equal to log N, and an edge event is an event whose simulation in a processing element is directly affected by information originating in another processing element, and (b) outputting results of the simulations.

22. (New) A storage element comprising:

a first module that, when executed in a processor, simulates operational events of a stored subsystem that is part of a system of interacting subsystems, primarily in blocks that contain M edge events, in addition to non-edge events, where M is approximately equal to log N, and an edge event is an event whose simulation in a processing element is directly affected by information originating from simulations by another module that is substantially the same as said first module, which other module is executed in another processor; and

a second module that outputs simulated operational events resulting from execution of said first module.

5

Lubachevsky 10-2

5. (Original) The method of claim **4** where said information shared by each PE in a communication phase of an iteration is related to events simulated by said each PE in said iteration.

6. (Original) The method of claim **4** where said assessment phase carried out by each of said PEs comprises the steps of

determining whether the existence of a simulation error can be excluded, and

directing that another simulation iteration is to take place when the existence of a simulation error cannot be excluded.

7. (Previously Presented) The method of claim **6** further comprising a floor advancement step that is carried out in each of said PEs when said step of determining in said assessment phase concludes that there are no simulation errors in a simulation iteration, where the advancement step advances a simulation floor time of a present simulation step to form a modified simulation time floor, for simulating another block of M events in a next simulation step.

8. (Original) The method of claim **6** further comprising a step of advancing a simulation floor time from a simulation floor time of a present simulation step, to form a modified simulation floor time, for starting from said modified simulation floor time the simulation of another block of M events in a next simulation step, when said step of determining in said assessment phase concludes that there are no simulation errors in said present simulation step.

9. (Original) The method of claim **8** where said modified simulation floor time corresponds to the earliest simulation time of the Mth edge event simulated by said N PEs in said present simulation step.

10. (Original) The method of claim **4** where events are simulated seriatim in each simulation phase.

3

Lubachevsky 10-2

23. (New) The storage element of claim **22** further comprising a third module that communicates with said other module.

24. (New) The storage element of claim **23** further comprising a fourth module that assesses whether, based on information received by said third module, any of said M edge events need to be re-simulated.

6